National HIV Nurses Association (NHIVNA) Study Day in collaboration with the British Psychological Society
'Current Issues in HIV'

National HIV Nurses Association

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Screening for HAND

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Session Plan

- Overview of HAND
- Approaches to assessment & screening
- Practice test administration
- Discussion, Q&A

Definitions

- Very confused, until recently e.g.,
  - ARC
  - AIDS Dementia Complex
  - HIV/AIDS Encephalopathy
  - HIV/AIDS Dementia
  - HIV Minor Cognitive Motor Disorder
- now *some* agreement on…

Definitions[1]

HIV-Associated Neurocognitive Disorder

- HAND, is the general term covering:

- Asymptomatic Neurocognitive Impairment
  - H-ANI – mild
- HIV-associated Mild Neurocognitive Disorder
  - H-MND – moderate
- HIV-associated Dementia
  - H-AD – severe

Definitions

- Asymptomatic Neurocognitive Impairment
  - mild cognitive impairment in 2 or more functions
  - no impairment in ADLs
- Mild Neurocognitive Disorder
  - mild cognitive impairment in 2 or more functions
  - mild impairments in ADLs
- HIV-associated Dementia
  - marked cognitive impairment in 2+ functions
  - marked impairments in ADLs

Definitions

- Mild cognitive impairment
  - = more than 1 SD below mean expected
- Marked cognitive impairment
  - = more than 2 SD below mean expected
- Impairment in ADLs
  - reported by self, informant, or observed
- Not attributable to delirium or other causes

Prevalence[2]

- Asymptomatic Neurocognitive Impairment
  - 33%
- Mild Neurocognitive Disorder
  - 12%
- HIV-associated Dementia
  - 2%

1555 HIV+ clients receiving CART in 6 US research clinics

HAND & CART

CART has …

- Reduced severity of HAND
- Reduced incidence of HIV dementia
- Reduced progression from mild to marked

- Increased prevalence of milder HAND
- More ‘static’ profile, with fluctuation
- Increased interaction with aging

Outcomes

- Reversal
  - evidence of restoration of function on initiation of CART in naïve patients
  - evidence of reversal/inhibition of decline in CART adjusted to include highly CNS-penetration
- Statis
  - asymptomatic-untreated and CART-treated may remain static – not a ‘degenerative’ illness
- Progression
  - Untreated, symptomatic and co-morbid presentations may lead to decline

Neuropsychological Deficits[3]

Triad of Impairments
- Cognitive
- Motor
- Personality

Suggestive of
- Subcortical dementia, or
- Fronto-striatal syndrome

≈ Parkinson's disease, PSP, vascular dementia
(and not Alzheimer's-type)

Profile of Deficits

1. Cognitive
   - information processing speed
   - psychomotor speed & coordination
   - attention and concentration
   - executive function (switching between tasks)
   - learning and memory
2. Motor
   - Gait, incoordination, tone, tremor
3. Mood & Behaviour
   - apathy, depression; impulsivity, agitation

Emergence of Deficits

- Asymptomatic Neurocognitive Impairment
  - mild cognitive decline (2 or more areas)
- Mild Neurocognitive Disorder
  - mild cognitive impairment (2 or more areas)
  - + mild-moderate motor dysfunction
- HIV-associated Dementia
  - marked cognitive impairment
  - + moderate-severe motor dysfunction
  - + mood and behaviour disturbance

Typical HAD Profile

Cognitive

- Impaired attention and processing speed
- Impaired new learning and memory
- Impaired verbal abstraction and visuospatial skills

Motor

- Slow motor speed, poor manual dexterity
- Neurological : abnormal gait, limb incoordination

Personality

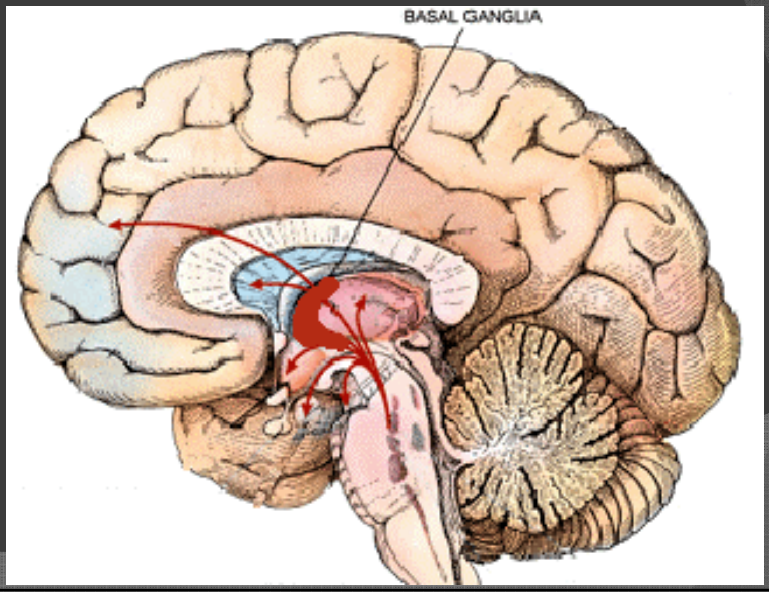
- apathy, inertia, irritability, emotional lability,
- impaired judgment and social skills, disinhibition.

Neuronal Dysfunction[4]

MRI/fMRI and PET suggest

- decreased metabolism in thalamus
- decreased metabolism in basal ganglia
- diffuse non-enhancing white-matter hyperintensity
- cerebral atrophy and
- ventricular enlargement in later stages

Neuronal Dysfunction



Aetiology[5]

- Primary Viral Syndromes
- Secondary Neurological Sequelae

Primary Presentations

- CNS disorder
- Other neuropathies
  - Vacuolar myelopathy
  - Peripheral neuropathies
  - Polymyositis

Neuronal Processes

- Neuro-invasion? Doubtful?
- HIV may enter CNS by transcytosis of endothelial cells
  - replicates in endothelial cells and infects monocytes, microglia, oligodendrocytes. astrocytes, macrophages.
  - these release chemokines, pro-inflammatory cytokines, nitrous oxide or other neurotoxins
- also CNS damage by immune response

Secondary Presentations

- Opportunistic viral illnesses
- Nonviral infections
- Neoplasms
- Cerebrovascular

Opportunistic viral illnesses

- Cytomegalovirus (CMV)
- Herpes simplex virus Types 1 and 2
- Varicella zoster virus
- Papovavirus PML
  - progressive multi-focal leukoencephalopathy
- Adenovirus Type 2

Nonviral infections

- Toxoplasma gondii
- Cryptococcus neoformans
- Candida albicans
- Aspergillus fumigatus
- Coccidioides immitis
- Mucormycosis
- Rhizopus sp.
- Acremonium alabamensis
- Histoplasma capsulatum
- Mycobacterium hominis tuberculosis
- Mycobacterium avium-intracellulare
- Listeria monocytogenes
- Nocardia asteroides
- Streptococcus pneumonia
- Hemophilus influenza

Neoplasm

- Primary CNS lymphoma
- Metastatic systemic lymphoma
- Metastatic Kaposi's sarcoma

Cerebro-vascular

- Ischaemic-haemorrhagic infarction
- Haemorrhage
- Vasculitis

Adherence

- Interaction with CART Adherence
  - poor adherence → poor suppression
  - poor suppression → cognitive decline
  - cognitive decline → poor adherence

Assessment: Rationale

- Detect and limit disease progression
  - HAND is associated with ↑ mortality
  - Adjust CART regimen
  - Prompt closer/assertive monitoring
  - Detect other pathologies
  - Treat other pathologies
  - Assert and support adherence

Assessment: Rationale

- Provide support
  - Provide education & information
  - Refer for cognitive rehabilitation
  - Refer for functional support
  - Refer for psychological support
  - Preserve independence
  - Protect from abuse

Assessment : Strategy

- How to detect and measure …?
  - cognitive impairment
  - neurological disorder
  - impairment in ADLs

Assessment : Strategy

- Cognitive impairment
  - Refer for neuropsychological assessment
  - screening cognitive assessment
- Neurological disorder
  - clinic review
- Impairment in ADLs
  - patient report; informant report
  - IADLS instruments

Cognitive Domains

- Orientation (to exclude delirium)
- Processing Speed
- Motor coordination
- Attention
- Execution
- Memory
- Language
- Visual-perceptual function

Screening Instruments

- Brief HIV-specific
  - HIV Dementia Scale (HDS)
  - International HIV Dementia Scale (IHDS)
- Generic Mental Status
  - Mini Mental State Examination (MMSE)
  - Montreal Cognitive Assessment (MoCA)
- Computerised
  - CogState

HIV Dementia Scale (HDS)[6]

1. Memory Registration:

Give four words to recall (dog, hat, green, peach) – one second to say each. Ask the patient to repeat all 4 after you have said them.

2. Anti-saccadic Attention

With hands up at patient's shoulder-width and eye-height, ask patient to look at nose, and then look at hand if any fingers move. Examiner moves index finger of one hand, checks response, and repeats until patient is familiar with task. Then examiner changes instruction, asking patient (when fingers move) to look at the fingers of the other (non-moving) hand: a measure of inhibition.

Perform 20 trials: An error is when the patient looks at moving finger.

<3 errors = 4; 4 errors = 3; 5 errors = 2; 6 errors = 1; >6 errors = 0

HIV Dementia Scale (HDS)

3. Psychomotor Speed

Ask patient to write the alphabet in upper case letters horizontally across the page and record time in seconds.

<21 s = 6; 21.1 to 24 s = 5; 24.1 to 27 s = 4;

27.1 to 30 s = 3; 30.1 to 33 s = 2; 33.1 to 36 s = 1; >36 s = 0

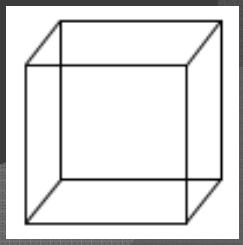
4. Word Recall

SAY: "Now, tell me those four words I asked you to repeat to me a few minutes ago." I point per item correct.

5. **Construction**

Present wire cube design, ask patient to copy and record time to completion.

<25 sec = 2; 25 to 35 sec = 1; >35 sec = 0



HIV Dementia Scale (HDS)

- 5 minutes to administer, simple tasks
- Score a total composite out of 16

- Good for neurology and speed
- Fair for attention, memory and visual

- No screen for delirium
- No tests of frontal-executive function
- Insensitive to mild impairments

- Sensitivity and specificity fair for HAD

International HDS[7]

1. **Memory Registration**:

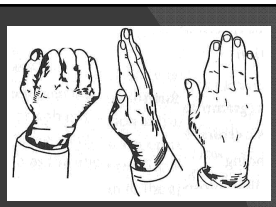
Give four words to recall (dog, hat, bean, red) – one second to say each. Ask the patient to repeat all 4 after you have said them.

2. **Motor Speed:**

Ask patient to tap the first two fingers of the non-dominant hand as widely and as quickly as possible. Record for 15 seconds and count taps achieved

4 = 15 = 4; 3 = 11-14; 2 = 7-10; 1 = 3-6; 0 = 0-2 in 5s.

International HDS



3. Psychomotor Speed:

SAY: *"Look carefully at what I am doing."* With left hand, perform 3 fist-chop-slap cycles. Demonstrate and have patient perform twice for practice. SAY: *"Now, with your (non-dominant) hand, do the same as me, first with me."* Perform cycles with client, until sequence is learned, then SAY: *"Good, now keep going, as quickly as you can."* Count cycles achieved in 10 seconds:

Score 4 = 4 seq; 3 = 3 seq; 2 = 2 seq; 1 = 1 seq; 0 = unable

4. Memory-Recall

Ask the patient to recall the four words. For words not recalled, prompt with a semantic clue as follows: *animal* (dog); *piece of clothing* (hat); *vegetable* (bean); *colour* (red).

1 point for each spontaneous recall; 0.5 for prompted answers

International HDS

- <5 minutes to administer, simple tasks
- Score a total composite out of 12

- Fair for neurology and speed
- Fair for attention and memory

- No screen for delirium
- No tests of frontal-executive function
- Very insensitive to mild impairments

- Sensitivity and specificity fair for HAD

MMSE[8]

The mini mental state examination

Orientation

Year, month, day, date. season	_____/5
Country, county, town, hospital, ward (clinic)	_____/5

Registration

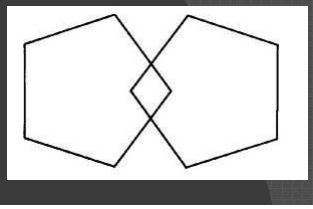
Examiner names three objects (for example, apple, pen, and table)	
Patient asked to repeat objects, one point for each.	_____/3

Attention

Subtract 7 from 100 then repeat from result, stop after five subtractions. (Answers: 93, 86, 79, 72, 65)	
Alternatively if patient errs on subtraction get them to spell world backwards: D L R O W	
Score best performance on either task.	_____/5

MMSE

CLOSE YOUR EYES



Language

Name a pencil and a watch.	_____/2
Repeat: 'No ifs, and or buts.'	_____/1
Give a three stage command. Score one for each stage (for example, 'Take this piece of paper in your right hand, fold it in half and place it on the table.'	_____/3
Ask patient to read and obey a written command on a piece of paper stating: 'Close your eyes.'	_____/1
Ask patient to write a sentence. Score correct if it has a subject and a verb.	_____/1

Copying

Ask patient to copy intersecting pentagons.	
Score as correct if they overlap and each has five sides.	_____/1

MMSE

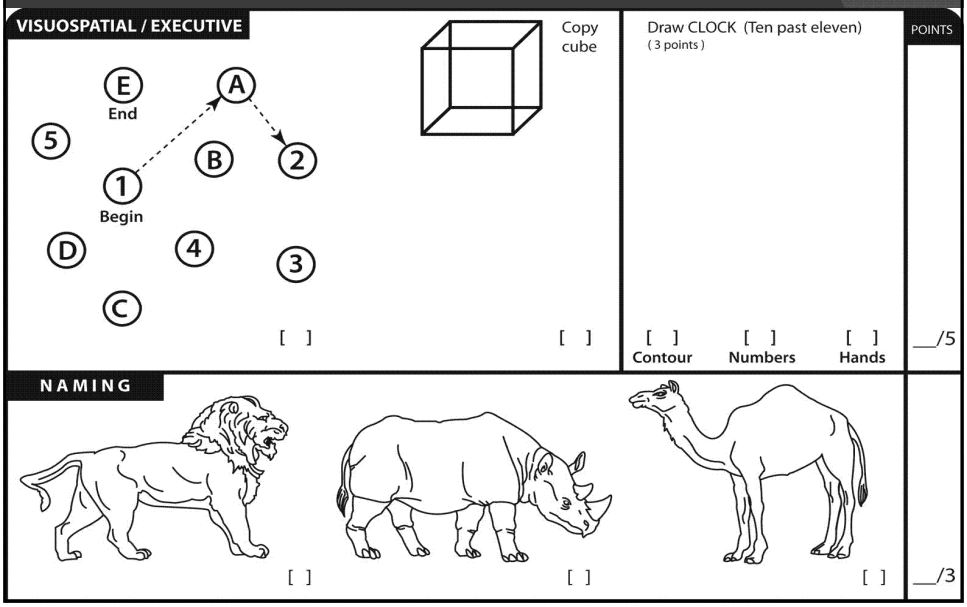
- 10 minutes to administer, very familiar
- Score a total composite out of 30

- 10/30 based on *Orientation*
  - good for delirium, though not specific to HAND

- No test of frontal-executive function
- No test of processing speed
- No test of gait or neurological function

- Poor sensitivity and specificity for HAND

MoCA[9]



MoCA

MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.		FACE	VELVET	CHURCH	DAISY	RED	No points
	1st trial						
	2nd trial						
ATTENTION Read list of digits (1 digit/ sec.).	Subject has to repeat them in the forward order [ ] 2 1 8 5 4 Subject has to repeat them in the backward order [ ] 7 4 2						__/2
Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors [ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B							__/1
Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65 4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**							__/3

MoCA

LANGUAGE Repeat : I only know that John is the one to help today. [ ] The cat always hid under the couch when dogs were in the room. [ ]							__/2
Fluency / Name maximum number of words in one minute that begin with the letter F [ ] ____ (N ≥ 11 words)							__/1
ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler							__/2
DELAYED RECALL	Has to recall words **WITH NO CUE**	FACE [ ]	VELVET [ ]	CHURCH [ ]	DAISY [ ]	RED [ ]	Points for UNCUED recall only	__/5
Optional	Category cue						
	Multiple choice cue						
ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City							__/6

MoCA

- 15 minutes to administer, needs practice
- Score composite (/30), but also at task level

- Good on attention and executive function
- Includes orientation
- Includes learning & memory
- Includes language and visual-perception

- No test of processing speed
- Sensitivity and specificity for HAND not known

CogState[10]

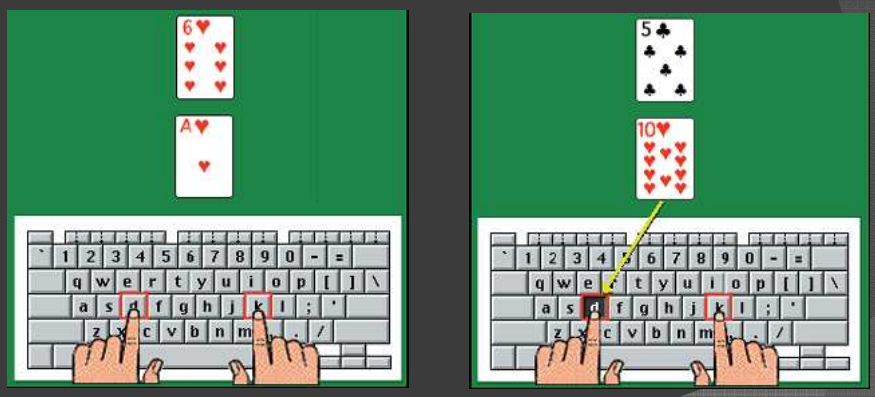
- Computer-based test, operated over internet
- Self-administered, automatically scored
- 15-20 minutes to complete
- Subtests ‘build’ on each other
- Instructions given by demonstration & feedback
- Assesses both speed (RT) and accuracy

CogState

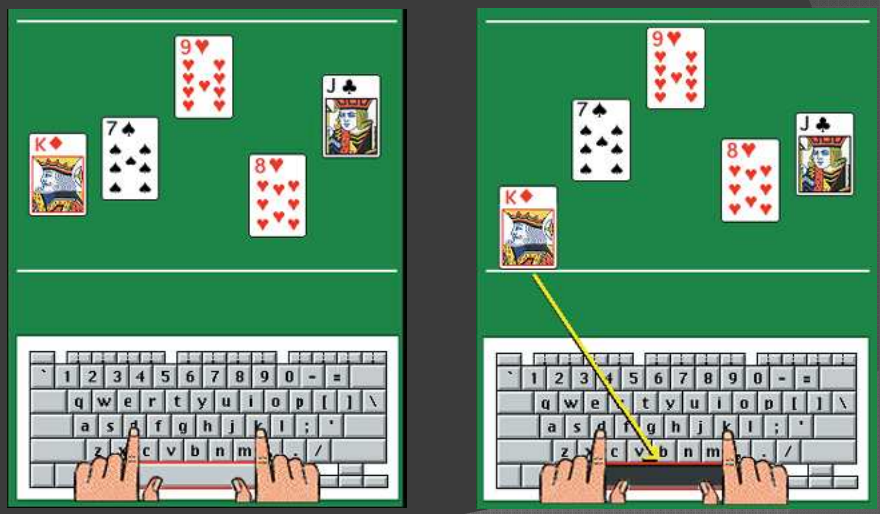
Subtests

- Simple reaction time
- Choice reaction time
- Complex reaction time
- Continuous performance (monitoring)
- One-back working memory
- Matching
- Incidental learning
- Associate learning

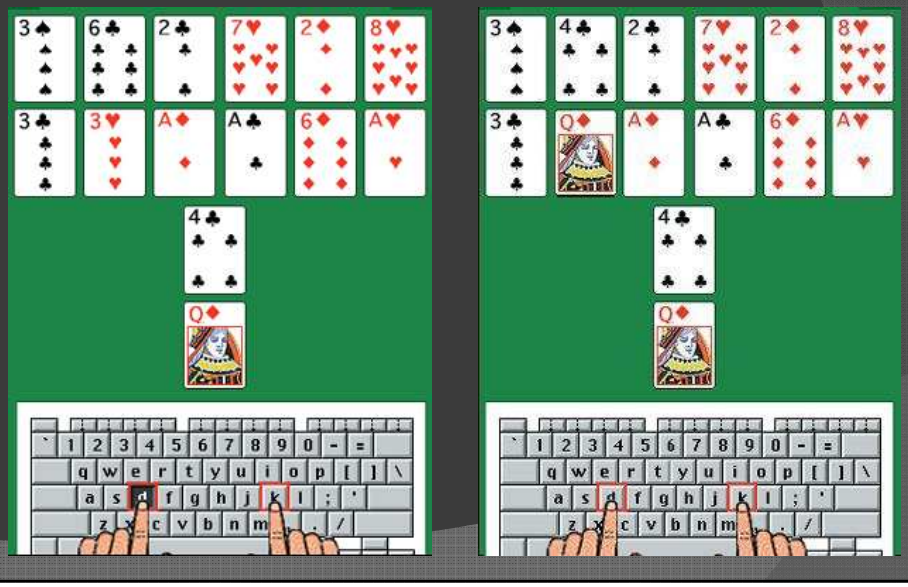
CogState: complex choice RT



CogState: monitoring



CogState: matching



CogState

- 20 minutes to administer
- Scores at sub-task level

- Good on attention and processing speed
- Includes learning & memory
- Minimal for executive function

- No test of orientation
- No tests of language or visual-perception

- Sensitivity and specificity for HAND fair

Interpretation

- Premorbid Ability
  - More able patients do better:
  - good scores mask emerging problems
- Education
  - More educated patients do better:
  - good scores mask emerging problems
- Language
  - EAL patients obtain lower scores:
  - interpret low scores with caution

Test Evaluation

- No one set covers all needed domains
- HIV-specific sets
  - address key deficits
  - but are insensitive
- Generic sets
  - address cognition broadly
  - but miss key areas of HIV presentation
- Solution: combine

Summary

- Cognitive impairments common in HIV
- associated with ↓adherence, ↑mortality
- Assess IADLS
- assess cognition
  - use tests in combination
  - interpret with care
- Refer when in doubt

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